MERCURY

Structural Equation Modeling (SEM) Training

1 – 5 February 2027
Cape Town (South Africa)



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Ref: 15592_1065036 **Date:** 1 – 5 February 2027 **Location:** Cape Town (South Africa) **Fees:** 5300 Euro

Introduction:

Structural Equation Modeling SEM is a vital statistical methodology that evaluates and posits causal relationships using statistical data and qualitative causal suppositions. SEM is a complex technique that enmeshes many mathematical models, algorithms, and statistical methods to align networks of theoretical constructs with empirical data.

These constructs are frequently conceptualized as latent variables, not directly observed but surmised from other observable variables indicators. SEM is an influential tool for probing intricate intersections among observed and latent variables. SEM has proven indispensable within the social sciences, psychology, education, and other research realms.

SEM is a versatile scaffold supporting a broad spectrum of models, ranging from simple linear regressions to nuanced hierarchical and multivariate constructs. It transcends traditional multivariate analyses that focus solely on observable variables by embracing latent variables and factoring in measurement error, thereby refining the precision and validity of its outcomes.

The quintessential strength of SEM lies in its capacity to empirically validate theoretical models against observed data measuring the fit of the hypothesized model. The model is based on theoretical considerations, estimating the parameters, and rigorously evaluating the model's fit to the data. A model that exhibits a good fit suggests that the proposed relationships among variables are concordant with the data, bolstering the underpinning theoretical framework.

Understanding Structural Equation Modeling SEM:

The SEM process comprises key phases: model specification, identification, estimation, testing, and modification. In model specification, the researcher delineates the structure based on underlying theories. Identification ensures adequate data points are available for accurate parameter estimation.

Estimation entails deducing the parameter values that optimally align with the data. Following estimation, model testing scrutinizes how well the model conforms to the data via indices like the Chi-square test, RMSEA, and CFI. In the event of a poor fit, the model may be altered to enhance its alignment.

Specialized software such as AMOS, LISREL, and Mplus is essential for conducting SEM. These platforms provide tools for complex calculations, model visualization, and assessment. Path diagrams are often used for graphic representation, visualization of variable relationships, and interpretation of outcomes.

SEM furnishes researchers with a potent framework for dissecting and testing complex variable relationships. By weaving together theoretical models with empirical data, SEM augments the understanding of phenomena and unveils deeper insights into their intrinsic dynamics.

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Targeted Groups:

- Researchers in Social Sciences.
- Psychologists.
- Educators.
- Market Researchers.
- Healthcare Analysts.
- Economists.
- Business Analysts.
- Graduate Students in Quantitative Fields.
- Statisticians.
- Data Scientists.
- Policy Analysts.

Targeted Competencies:

At the end of this Structural Equation Modeling SEM training, target competencies will:

- Understanding of Statistical Concepts.
- Proficiency in Model Specification.
- Ability to Identify and Estimate Models.
- Skills in Using SEM Software e.g., AMOS, LISREL, Mplus.
- Competence in Evaluating Model Fit.
- Knowledge of Path Diagram Interpretation.
- Capability to Test and Modify Models.
- Familiarity with Latent Variables and Measurement Errors.
- Analytical Thinking for Complex Data Relationships.
- Applying Theoretical Frameworks to Empirical Data.

Course Objectives:

By the end of this Structural Equation Modeling SEM course, participants will be able to:

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- Grasp the fundamental concepts of SEM.
- Specify structural equation models based on theoretical underpinnings.
- Hone skills in identifying and estimating SEM parameters.
- Master SEM software applications.
- Assess model fit utilizing a range of fit indices.
- Interpret and construct path diagrams.
- Integrate latent variables and contend with measurement errors.
- Empirically test and ratify theoretical models.
- Amend and refine model specifications when necessary.
- Implement SEM strategies in real-world research contexts.

Course Content:

Unit 1: Introduction to Structural Equation Modeling:

- Define SEM and discuss its significance.
- Delve into the historical context and evolution of SEM.
- Articulate basic SEM concepts and jargon.
- Differentiate between observable and latent variables.
- Comprehend the impact of measurement error in SEM.
- Identify principal SEM applications across diverse fields.

Unit 2: Model Specification and Identification:

- Formulate SEM models grounded in theoretical constructs.
- Acknowledge the criticality of model specification.
- Define the process of specifying measurement models.
- Dissect structural models and their constituents.
- Recognize potential model identification issues.
- Ascertain precise model identification for reliable estimation.

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Unit 3: Estimation Techniques in SEM:

- Comprehend varied estimation methodologies within SEM.
- Explore Maximum Likelihood Estimation MLE.
- Examine alternative techniques like GLS and WLS.
- Scrutinize the underlying assumptions of each estimation method.
- Gauge the effects of different estimation techniques on model fit and parameter veracity.
- Practice estimation tactics through SEM software.

Unit 4: Assessing Model Fit:

- Understand the importance of appraising model fit.
- Get to know an array of fit indices such as Chi-square, RMSEA, CFI, and TLI.
- Engage in criteria establishment for model fit adequacy.
- Investigate overarching model fit appraisal methods.
- Evaluate local fit with the aid of modification indices and residuals.
- Interpret fit indices to endorse theoretical models.

Unit 5: Advanced Topics in SEM and Practical Applications:

- Unravel multi-group SEM and its applications.
- Learn about longitudinal SEM and growth curve modeling.
- Address missing data occurrences within SEM.
- Delve into mediation and moderation analyses within SEM frameworks.
- Employ SEM approaches in complex, real-world datasets.
- Utilize SEM software for intricate model construction and analysis.
- Partaking in case studies to solidify the application of acquired skills.